Estimation of Nominal and Effective Rates of Protection

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[*The following is a brief description of a research project conducted at Korea Development Institute that estimated nominal and effective rates of protection for the Korean economy in 1990. Preliminary estimates of nominal rates of protection are reported in Yoo in Ito and Krueger (1993), and a full report is published by KDI in Korean in Yoo et al (1993). A full report has not been presented to English speaking audience.*]

1. Background: concepts of nominal and effective rates of protection

When imports of a good are restricted by tariff or non-tariff barriers, the domestic price of the good tends to rise above the border price, the price that the good commands when it arrives at the border. Nominal rate of protection (NRP) is the rate by which the domestic price of the good exceeds the border price. Let *t* stand for nominal rate of protection. It may then be expressed as:

$$(1)\quad t_j = \frac{P_j}{P_j^*} - 1, \; j = 1, 2, \ldots, K,$$

where subscript *j* refers to the j-th good, *K* is the number of tradable goods, P stands for the price of a given good, and * indicates the variables "before" imposition of tariffs or non-tariff measures.

NRP is not a good indicator of how much the domestic producers are protected by the tariff or non-tariff measure that gave rise to the NRP. For domestic producers, of greater interest than the price rise is the rise in value added, that remains of a unit value of output after the cost of intermediate inputs is deducted. A better indicator of the protection accorded to the domestic producers is the effective rate of

protection (ERP), which is the rate by which the value added increases after the imposition of protective measures. Let z stand for ERP. It may then be expressed as:

$$(2) \qquad z_j = \frac{VA_j}{VA_j^*} - 1, \; j = 1, 2, \ldots, K,$$

where VA stands for value added and other symbols have the same meaning as before. A word of caution is in order here. The statement that "the value added increases" does not mean that protection can somehow create more value added out of the same quantities of inputs as does a rise in productivity. In fact the physical input-output relation will be assumed to remain the same in this paper before and after the imposition of tariffs or non-tariff measures. What is meant is that the "price" of value added rises as a result of protection not the "quantity" of value added.

How a set of NRPs changes the ERP of a given good is shown in the following equation. For the moment it will be assumed that intermediate inputs are all tradable goods and that tariff is the only protective measure employed. Shortly, these assumptions will be done away with.

$$(3) \quad z_j = \frac{(1+t_j) - \sum_i a_{ij}(1+t_i)}{1 - \sum_i a_{ij}^*} - 1 = \frac{t_j - \sum_i a_{ij}^* t_i}{1 - \sum_i a_{ij}^*}$$

where a_{ij} stands for the amount of input of Good i required to produce a unit value, say, a dollar's worth, of Good j. In the first expression on the right hand side the denominator represents the value added before imposition of tariffs for a unit value of output j, and the numerator the value added after the imposition. The first term in the numerator shows that the price of the output increases by t_j times 100 percent, and the second term shows how much the costs of intermediate inputs increase, each increasing by t_i times 100 percent. Hence, not just the tariff on Good j but the tariffs on other goods of intermediate inputs have to be taken into account in order to see how a given set of tariffs changes the value added for the producers of Good j. It should be noted that the small country assumption was made here and will be maintained throughout the paper.

Effective rate of protection can be less than zero, a case of negative z_j. This would arise, if a given set of tariffs raises the cost of the intermediate inputs, the second term, more than the price of output, the first term in the numerator of equation (3). A negative z_j means that the net effect of the protection is to reduce the value added of good j, hurting the domestic producers, although the t_j, the nominal rate of protection, may be positive.

As a practical matter of estimation, however, a negative effective rate of protection may be estimated for certain goods, even when protection increases the valued added. It will happen, if the denominator of equation (3) is negative in value, while the numerator is positive. A positive numerator means that the price of the good is greater than the cost of production after imposition of tariffs, and a negative denominator means that the cost of production is greater than the price before the imposition. This would be the case, if production of the good in question is not commercially viable without protection but only survives thanks to protection. Though rare, this possibility should not be ignored in estimating the effective rates of protection.

2. Estimation of nominal rates of protection

It would be simple to estimate the NRP, if tariffs were the only protective barrier that restricts imports and applied to all imports without exception. In reality there are other barriers restricting imports such as quantitative restrictions, import approval or recommendation system, safety standards, hygienic standards, other special laws and so on. Also, the government may exempt or rebate tariffs when imports are used for some specified purposes such as production of exports, research and development, or other purposes that are deemed desirable in the country. Hence, the rates in the tariff schedule are more often than not a poor indicator of the nominal rate of protection. It would be ideal if domestic prices and border prices were known, as the domestic prices would bear all of the effects of tariff and non-tariff measures of protection. Of course, the information is not readily available but has to be collected through a survey, and the survey is not always accurate.

This consideration suggests three possible candidates from which to choose one as the estimate of NRP for an industry. One candidate is “legal tariff”, i.e., the tariff rate on the tariff schedule, and the other is “actual tariff” which may be obtained by dividing the tariff revenue on an import good by the value of imports. The third one is “tariff equivalent”, the ratio of domestic price to border price less one, both prices obtained through a survey.

2.1 The survey

The survey was conducted in 1990 on 766 8-digit level KSIC (Korea Standard Industrial Classification) products in the mining and manufacturing sectors. They accounted for 85 percent of the outputs of the two sectors. Respondents were establishments with 10 or more employees. It was decided that these producers must know better than others the domestic and border prices of the goods that they produce, whether competing with imports or exporting. The survey covered all establishments with 100 or more employees. Others with fewer employees were ranked by amount of shipments, and those ranked high

were included in the survey ahead of others until 70 percent of the total shipments of the product is reached. A total of 6,547 establishments were surveyed.

Each establishment was asked to pick three specifications of a product that they produced most and to supply for each specification both the domestic price before indirect taxes and the border price. A product even at 8-digit level industrial classification varies a great deal in price depending on specifications regarding the shape, size, structure, functions, and so on. The border price here refers to cif (cost, insurance, freight) price in the case of import-competing goods and fob (free on board) price for export goods.

Given the purpose of the survey, only those responses with both domestic and border prices could be used. The survey produced 11,203 such responses at the "specification" level on 757 8-digit KSIC products. The establishments that provided the useful responses accounted for 38 percent of the total shipments of those establishments with ten or more employees in the mining and manufacturing sectors.

For the ratio of domestic price over border price of agricultural commodities, Korean government's report on tariff equivalents in 1991 to Negotiating Group on Agriculture of the Uruguay Round was relied on. For fishery and forestry products, the comparison between domestic and border price could not be made, and only legal and actual tariffs were considered as the candidates for the nominal rate of protection.

2.2 Concordance

In estimating the effective rates of protection the nominal rates were going to be applied on the input-output (I-O) tables that were regularly estimated and published by Bank of Korea. This means that the legal tariff rate, actual tariff rate, and tariff equivalent have to be found for each of the goods-producing I-O industries so that one of the three candidates may be chosen to be the estimate of nominal rate of protection. Therefore, two concordances were necessary: one between I-O industries and SITC (Standard International Trade Classification) or HS (Harmonized System) by which the tariff rates were going to be collected; the other between I-O industries and 8-digit KSIC by which the tariff equivalent for a product would be found through a price survey.

The I-O table used in the estimating ERP had 161 industries in total with 122 of them producing goods. However, estimation of NRPs, explained in the following, was first conducted at a more finely defined level of 402 I-O industries with 316 of them producing goods. The estimates at this level are then aggregated to obtain NRPs for the 122 I-O industries.

2.3 Selection of Nominal Rates of Protection

At the level of 402 I-O industries the estimation of NRP was to select one as the estimate among three candidates, namely, legal tariff, actual tariff, and tariff equivalent. Legal tariff (LT) for an industry was obtained by taking a simple average of the tariffs on the goods belonging to the industry. Actual tariff (AT) was obtained by dividing the tariff revenue on imports of the goods belonging to the industry by the imports. Tariff equivalent (TE) was obtained through the survey as explained earlier. TE can be greater or smaller than either LT or AT. But LT is supposed to be greater than AT for a good, since only exemption can make the two differ from each other. When an average was taken of the tariffs on more than one goods belonging to the same industry, it may happen that LT is found to be less than AT in some exceptional cases. Care should be taken in such cases.

What had to be done was to select among the three candidates, without knowing, the one that best represents the "true" price gap between domestic and border prices of the goods belonging to an industry. The selection took into consideration the industry's trade-characteristics, that is, how actively traded were the goods and, if they were, whether they mostly competed with imports or were exported. An I-O industry was considered import-competing, if its import dependency is greater than 10 percent. Here, import dependency is the ratio of imports to domestic consumption, which is an industry's outputs plus imports minus the sum of exports and inventory increase. For such an import-competing industry the estimation procedure, to be described in the following, assumed that the determination of domestic prices of the goods belonging to the industry was influenced by import prices. Then, the problem of selecting the NRP among the three candidates boils down to making a judgment on whether it was the tariffs or non-tariff measures that gave rise to the price gap between domestic and border prices. An industry was called export-oriented, if the share of exports in the industry's output exceeds 10 percent. For export-oriented industries it was assumed that the domestic prices of their outputs were more likely to be influenced by the export prices than by legal and actual tariffs on imports. An industry could be both import-competing and export-oriented, with both of its export share and import dependency being greater than 10 percent. In such cases all three candidates should be considered equally likely to represent the price gap. An industry may be neither import-competing nor export-oriented. Then, import restrictive measures may have little influence on the price gap. In any case it should be noted that the small-country assumption was made regarding foreign demand and supply.

< Selection Rules for Import-Competing Industries>

a) TE > LT

This is a case of tariff equivalent (TE) found to be greater than legal tariff (LT), that is, the domestic price

was found to exceed import price by more than what can be explained by tariffs. If there was one or more non-tariff measures (NTM) restricting imports, TE was chosen to be the NRP. If there was none, LT was chosen. In some instances, even though there was no NTM, when the survey results looked robust, for example, in view of the number of responses, then TE was chosen to be the NRP.

b) LT > TE > AT

The first inequality shows that, according to the price survey, the domestic price exceeded border price by less than the legal tariff. This was taken as an indication that legal tariff was ineffective in affecting the determination of the domestic price, perhaps, because of extensive exemptions. So it was decided that the choice to be made was between TE and AT. As in a), if there was some NTMs, TE was selected. If there was none, AT was selected.

c) AT > TE > 0

Since AT was the tariff rate that was actually applied, the domestic price was supposed to be higher than the border price by at least AT. This means that the first inequality cannot hold, if the goods belonging to the industry in question were homogeneous. For this reason, the inequality was taken as an indication that least two different kinds of goods, 1 and 2, belong to the industry. Let's suppose Good 1 was imported, but Good 2 was not, because TE was smaller than AT for Good 2. Then, it was possible to obtain the inequality, even if the actual tariff rates were the same for the two goods. For, then, the AT for the industry would reflect only the AT on imported Good 1, while the obtained TE for the industry was an average of the AT on Good 1 and TE on Good 2 that was not imported.

In this case the information available on sub-industries that constitute 402 I-O industries was taken into consideration. If a sub-industry were import-competing that had a big weight in output supply of the industry in question, AT was chosen as the NRP; if it were not import-competing, TE was chosen. Even though a NTM existed, it did not affect the selection, since an AT greater than TE implied that the NTM was less of a barrier than tariff. If there was a reason to question the validity of the price survey, the possibility was not ignored that TE may have been temporarily lower than AT at the time of the survey.

d) 0 > TE

The inequality implies that the domestic price is lower than the border price, a situation not likely to arise for import-competing goods. One possibility was that the import price was higher because the imported goods was of higher quality compared to domestic goods. In case import dependency was rather high for the industry in question this possibility was taken to be the reason, and AT (> 0) was chosen to be the NRP. If the industry was export-oriented as well as import-competing by the definitions adopted in the above and domestic goods appeared to be competitive, TE (< 0) was selected as

the NRP.

< Selection Rules for Export-Oriented Industries>

For the goods belonging to export-oriented industries, TE was mostly chosen to be the NRP. This was not just because the domestic prices are supposed to be mostly influenced by export prices. Another important reason was that for most export-oriented industries the survey results looked robust because of many respondents. The number of respondents who supplied both domestic and border prices, who were mostly exporters, were usually many times greater than that for the import-competing industries.

In many instances TE was much greater than LT or AT, an implausible phenomenon at first look for export-oriented industries. However, for many of such industries there were NTMs, indicating that their domestic markets were protected, for example, automobile industry. Another reason why the domestic prices may exceed the export price very much would be the monopoly power in the market, for example, in TV industry. In such cases LT was chosen to be the NRP for the reason that it reflects the protective measures. In other cases such as clothing industries that were very much export-oriented, LT was chosen for the same reason, although high domestic prices compared to foreign price were plainly observed. In some export-oriented industries such as cotton fabrics and silk fabrics where TEs not only were smaller than LT or AT but were slightly less than zero, TEs were chosen as the NRPs.

In selecting an NRP among legal tariff, actual tariff, and tariff equivalent it is difficult to devise a rule that can be mechanically followed that anticipates all factors affecting the price gap between domestic and border prices. As apparent in this explanation, it is almost unavoidable to make some judgement, often without sufficient information.

3. Estimation of Effective Rates of Protection

3.1 Cleaning the I-O tables of Indirect Taxes

What is left to do in estimating ERPs is to apply the NRPs to the I-O tables. The tables, however, had to be revised and a new set of I-O coefficients estimated before the application. One reason was that the estimation of ERPs could be distorted because of the indirect taxes included in the I-O transactions. When an indirect tax is levied on a good, it makes the industry's output appear greater in value terms and, therefore, the value added. When a good on which an indirect tax is levied is used as an intermediate input into the production of other goods, the indirect tax inflates the cost of the intermediate input, making the value added of these other goods appear that much smaller.[1] Therefore, the I-O tables had to be cleaned of the indirect taxes so that ERP estimates may not be affected by them. For this purpose

indirect taxes had to be subtracted from the two tables, the sum of which was the I-O Table: Transactions Table of Domestic Goods and Services and Transactions Table of Imported Goods and Services.

The Transactions Table of Domestic Goods and Services was cleaned as follows. From Bank of Korea the flows of Value-Added Taxes among the cells of the Table were obtained, and they could simply be subtracted from the table. Other indirect taxes were grouped into "proportional indirect tax", Special Consumption Tax and Alcohol Tax, and "Other Indirect Taxes". For each of these three groups the amount of tax revenue collected from each industry was available. The domestic Transactions table was cleaned of Proportional Indirect Tax and Other Indirect Tax, for each of these taxes, by deflating an industry's sales of inputs to other industries and to the final demand sector by the same implicit tax rate, which was calculated under the assumption that all the transactions were taxed by the same rate. In subtracting Special Consumption Tax and Alcohol Tax from the domestic Transactions table, it was taken into consideration that the inputs into the production of exports were exempted of the two taxes. (See the subsection 3.2 in the following.)

The Transactions Table of Imported Goods and Services had to be cleaned differently, because the indirect taxes were not separately available but only their sum was, which was called "import tax", while the sum was available for each industry. Also, a care was taken for the inter-industry transactions that did not include import tax, since rebates were allowed of the indirect taxes on imported inputs that went into the production of export goods. (See the subsection 3.2 in the following.)

3.2 Domestic Price Based I-O Table

The other reason why the I-O coefficients had to be revised to estimate ERPs was that the transactions reported in the I-O tables were a sum of two kinds of transactions that were valued differently. Because of the tariff rebate system, exporters and producers of the inputs that went into the production of exports could draw back the tariffs they paid on imported goods. This means that the values of some intermediate inputs for which producers could claim tariff rebates were valued in the border prices and others were valued in domestic prices. Thus, the next thing to do after cleaning the I-O tables of indirect taxes was to have the different transactions be revalued on the same valuation base, that is, the base of domestic prices. Two explanations are in order. One is how this was done; the other is why the valuation base chosen was that of domestic prices. Domestic prices were chosen to be the valuation base of all transactions of the I-O table for the simple reason that the border prices were not available for services, the non-tradables, and, therefore, the service transactions could not be revalued in border prices. So it was decided that the traded goods transactions valued in border prices be revalued in domestic prices and summed together with the other transactions that were already expressed in domestic prices.

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[1] For more detailed discussion see Corden (1971), especially Section III, Ch.3.

The transactions valued in border prices were the inputs of traded goods that went into the production of export goods and exports themselves. The amount of intermediate input i into export good j was estimated by multiplying the input coefficient a_{ij} of the industry j by its exports, E_j. The product a_{ij} x E_j was then inflated in value by the nominal rate of production for industry i, and this was summed with the other part of intermediate input i that was already valued in domestic price. This was done for both Transactions Table of Domestic Goods and Services and Transactions Table of Imported Goods and Services. For the domestic transactions table, E_j was also inflated by the nominal rate of protection for goods j. Then these two transactions tables were added together to obtain a new I-O table, all transactions of which were now valued in domestic prices. An industry's total output had to be newly estimated by summing across all industries the industry's supplies of inputs to them and its sales to the final demand sector. Lastly, a new set of I-O coefficients for each industry was obtained by dividing the inputs by the newly estimated total output for the industry.

The valuation base of this new set of I-O coefficients was domestic prices and they were free of indirect taxes. If we let a_{ij} stand for the new set of I-O coefficients, eq.(3) can be rewritten as follows.

$$(4) \quad z_j = \frac{VA_j}{VA_j^*} - 1 = \frac{1 - \sum_i a_{ij}}{\frac{1}{1+t_j} - \sum_i \frac{a_{ij}}{1+t_i}} - 1$$

3.3 Treatment of non-traded goods

So far it has been assumed for simplicity that no non-traded inputs are required in the production of traded goods. In an empirical study like this one they simply cannot be assumed away but somehow have to be dealt with. Two methods exist: Corden's and Balassa's. To describe these methods, it would be convenient to use some symbols. Let i and j indicate traded goods, of which there are K in number. Let m and n indicate non-traded goods, of which there are N in number. As before,

a_{ij} = required input of traded good i for the production of unit value of good j,

a_{mj} = required input of non-traded good m for the production of unit value of good j,

a_{in} = required input of traded good i for the production of unit value of non-trade good n,

a_{mn} = required input of non-traded good m for the production of unit value of non-traded good n.

Corden's ERP

Corden notes that "the prices of non-traded goods, just like the prices of the primary factors, are determined within the system while – given the small country assumption – the prices of traded goods are

given as parameters"[2]. According to him, while the immediate effect of a protective measure on good *j* is to raise the price of good *j* and its domestic production, this in turn increases the demand for, therefore, the prices of the non-traded goods required in producing good *j*. The prices of traded goods required in producing good *j*, however, would not be affected under the small country assumption, as they depend only on the effect of protective measures on them and their border prices.

The effect of a protection does not end in the industry protected but extends to other industries producing non-traded goods that are required in the production of the protected industry. Thus, Corden suggests that effective protection should measure not only the effect on the value added of the protected industry but also the effects on the values added of those industries producing the non-traded goods that are required in the production of the protected industry.[3]

How do we get at the values added of those industries producing the non-traded goods that are required in the production of the protected industry? The inputs into the production of a unit value of Good j may be expressed as follows:

(5) a_{1j} a_{2j} ... a_{Kj} $a_{K+1\,j}$ $a_{K+2\,j}$ ... $a_{K+N\,j}$ a_{vj},

where the first K inputs are traded inputs and the next N inputs are non-traded inputs and a_{vj} stands for value added by industry j. What Corden suggests is that an ERP should measure not only a_{vj} but also the values added that are directly and indirectly incorporated in a_{mj} for m = K+1, K+2, … K+N. The values added directly and indirectly incorporated in a_{mj} can be found by endlessly decomposing the non-traded inputs as follows. In the first round, a_{mj} can be decomposed into three parts that are indirectly required in producing Good *j* through non-traded good *m*: traded inputs, non-traded inputs, and value added. This is done for all a_{mj} for m = K+1, K+2, … K+N. In the second round, each of these indirectly required non-traded inputs are again decomposed into three parts of inputs. In the next round, these indirectly required non-traded inputs in the second round can further be decomposed. As the non-traded inputs are decomposed in this fashion endlessly, the non-traded inputs a_{mj} vanish and are successfully decomposed into two parts: indirectly required inputs of traded goods and indirectly incorporated values added that are created in the industries producing non-traded goods.

We can imagine collecting the inputs of traded goods at every round of the decomposition. Let r_{im} stand for this collection of the inputs of Good *i* that are directly and indirectly required in producing of a

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[2] Corden (1971), p.152

[3] In his words, "To obtain the value-added share for out formula all direct contributions by primary factors should in principle be summed with all indirect contributions by primary factors through non-

unit value of m. Then, a unit value of non-traded good m can be decomposed as follows:

(6) $1 = \sum_i r_{im} + r_{vm}$.

The first term on the right hand side is the sum of all directly and indirectly required traded inputs in the production of a unit value of m. The second term r_{vm} is the sum of the value added in industry m and all values added that are created in the industries that produce the indirectly required non-traded inputs into m.

Now a unit value of Good j can be expressed as follows:

(7) $1 = \sum_i a_{ij} + \sum_m a_{mj} + a_{vj} = \sum_i a_{ij} + \sum_m \sum_i r_{im} a_{mj} + \sum_m r_{vm} a_{mj} + a_{vj}$

where $r_{im}a_{mj}$ represents inputs of traded goods i that go indirectly into the production of j through non-traded good m, and $\sum_i r_{im}a_{mj}$ the inputs of all traded goods that go indirectly into the production of j through one non-traded good, m. Then, the second term on the right hand side of the second equality, $\sum_m \sum_i r_{im}a_{mj}$ represents the inputs of all traded goods that go indirectly into production of j through all non-traded goods. The next term $\sum_m r_{vm}a_{mj}$ represents the values added incorporated in the non-traded inputs. The equation shows that the sum of non-traded inputs $\sum_m a_{mj}$ is decomposed into these two terms in the last expression.

Corden's ERP of an industry j measures not only the effect of protection on j's value added, a_{vj}, but also the effects on the values added incorporated in the non-traded inputs a_{mj}, $r_{vm}a_{mj}$, for every non-traded input m. Thus, Corden's VAj in (4), the value added on domestic valuation base after imposition of protective measures may be expressed as:

(8) $VA(C)_j = 1 - \sum_i a_{ij} - \sum_m \sum_i r_{im} a_{mj}$

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traded inputs."*Ibid*, p.159

The border price counterpart, Corden's VAj* in (4), may be expressed as:

$$(9)\quad VA(C)_j^* = \frac{1}{1+t_j} - \sum_i \frac{a_{ij}}{1+t_i} - \sum_m \sum_i \frac{r_{im} a_{mj}}{1+t_i}\,.$$

In the first term on the right hand side, the unit value of *j*'s output is deflated by the NRP to get the unit value before the imposition of protective measures. Similarly, the price rises of traded inputs caused by the protective measures are deflated in the second term, and the indirect inputs of traded goods through non-traded inputs are also deflated. Then, the Corden's ERPs were obtained by substituting (8) and (9) into (2).

Balassa's ERP

Imposition of tariffs or non-tariff measures on Good *j* tends to increase its production and its price, and this lead to an increased demand for intermediate inputs, as before. But, unlike Corden, Balassa assumes that the increased demand for the non-traded intermediate inputs does not result in increases in their prices. When a set of tariffs or non-tariff measures are imposed on all traded goods, the prices of non-traded goods will rise only to the extent that the prices of traded inputs go up because of the protective measures.[4] This means that the value added of the industries producing non-traded goods is not assumed to rise in price.

Hence, Balassa's ERP of a traded good *j* is concerned only with how much the value added of industry *j* is affected. Thus, Balassa's VA*j* in (4) may be written

$$(10)\quad VA(B)_j = 1 - \sum_i a_{ij} - \sum_m a_{mj}$$

The border price counterpart VAj* in (4) may be written

$$(11)\quad VA(B)_j^* = \frac{1}{1+t_j} - \sum_i \frac{a_{ij}}{1+t_i} - \sum_m \sum_i \frac{r_{im} a_{mj}}{1+t_i} - \sum_m r_{vm} a_{mj}$$

Comparing these two equations with equations (8) and (9), one can see that the values added incorporated in non-traded inputs are excluded in Balassa's ERP and included in Corden's ERP.

4. Estimation Results and Policy Implications

4.1. NRPs

Nominal rates of protection were found to be much greater than tariffs. For all traded goods the NRP in 1990 was 25.9 percent, whereas the legal and actual tariff rates were, respectively, 12.4 percent and 10 percent. It shows that the non-tariff measures were very important restraints on imports. This was especially the case with regard to agricultural goods, for which NRP was 101.3 percent while the actual tariff rate was only 11.6 percent. For the manufactures, the NRP and actual tariff were, respectively, 20.5 percent and 10 percent, while they become 13.6 percent and 9.7 percent, when food products were excluded.

4.2 ERPs

The average effective rate of protection of all industries for producing traded goods for domestic sales was estimated to be 34.5 percent by the Corden method and 47 percent by the Balassa method. The rates for the agricultural sector were 160 percent and 183 percent, respectively. For the manufacturing sector they were 15.9 percent and 22.7. The ERP for agricultural sector was nearly ten times as large as that for the manufacturing sector in 1990.

As expected, the ERP estimates show much greater variation in its magnitude. The standard deviation of ERPs was more than three times as large as that for NRPs.

Some industries had negative ERPs, that is, their values added declined after the imposition of tariffs and non-tariff measures. An example was textile industry, for which NRPs on the intermediate inputs were relatively low but the NRP for its output was still lower. The low NRP on textile products may have been the result of the policy to promote clothing industry, an important export industry still in 1990, by keeping the input prices low. For footwear and electrical machinery including consumer electronics, which are also important export industries, ERPs were estimated to be much higher than the manufacturing average.

Also, negative ERPs of different class were estimated for some industries, which arises because value added at border prices was negative. In other words, the costs of intermediate inputs for the industries would have been greater than the output price, had there been no protection on the output, and they could not have survived. Examples were “meat and meat products” and “diary products”. The heavy protection of these food-processing industries were inevitable, if the livestock industry were to be protected at all.

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[4] Balassa and Associates (1971), Appendix A.

ERP for Export Production

It should be noted that the ERP is for the production for domestic market only. A typical industry produces its output for both domestic sales and exports, however. Hence, for many industries an ERP estimate is not a good measure of how much their value added rises in price. If this measure is desired for all sales, a weighted average of the ERP estimated and zero, the ERP for export sales, may be taken, with weights being the domestic sales for the former and export sales for the latter.

Since protective measures cannot raise the export price for an industry, the largest value the ERP for the industry's production for exports can attain is zero. And, this can be attained, only if the tariff rebate system succeeds in making all intermediate inputs available at the border prices for the industry. Otherwise, the ERP for export producing activities would be negative, implying that the value added would decline when protective measures are imposed on the system.

4.3 Implicit Income Transfer and Protection Tax

Implicit Income Transfer

The estimation procedure making use of an I-O table makes it possible to estimate implicit income transfers that protective measures give rise to. As mentioned earlier, the NRP is the rate by which domestic price of a good exceeds the border price. By applying the NRP to an industry's total supply to the domestic users, one can estimate what may be called "gross implicit income transfer", the amount of extra payments that the users make to the industry because of the protective measures.

The estimated gross implicit income transfer to all goods-producing industries was about 18 trillion won for 1990, which was slightly bigger than 10 percent of GDP for the year. (The average exchange rate was 707.97 won to a dollar for the year.) Nearly 43 percent of the total accrued to the agriculture and 56 percent to manufacture.

"Net implicit income transfer", the difference in the values added before and after protective measures, that accrues to primary factors taking part in an industry's production can also be estimated. The total to all goods-producing industries was estimated to be about 10.7 trillion won, of which nearly 65 percent accrued to the agriculture and 34 percent to the manufacture.

Implicit Protection Tax

Protective measures, of course, raise not just domestic prices but the import prices as well. The extra payments the domestic users make because of the rise in import prices were estimated to be 3.5 trillion

won, about one half of which was tariff revenue. These income transfers do not accrue to domestic producers, whom the protective measures intended to help, but to the government and importers. But the payments are made out of the users' pockets, and in this sense the sum of extra payments through the price rises in both domestic and foreign goods may be called "implicit protection tax". The implicit protection tax was 21.6 trillion won, compared to 34 trillion won of the central government's total expenditure for the year.

4.4 Policy Implications

What the findings of an exercise like this imply for a country's trade and other policies would differ from one country to another. In any case, the numbers estimated may facilitate the discussion and help focus on the desirable and undesirable impacts of protective measures. In general, given the estimates of NRPs, ERPs, income transfers, and protection taxes, and so on, policy makers and economists can ask if the estimates are more or less the intended results in terms of absolute magnitudes and relative magnitudes among the industries. If they are not what is intended, the next question would be, whether or not intended results can be achieved by utilizing the available policy tools.

The relatively high NRPs and ERPs, and the large sums of implicit income transfers and protection taxes were estimated, especially in the case of agricultural sector, for the Korean economy 1990. The estimates make one wonder if the policy makers would have had taken the same protective measures, had they known what the consequences would be.

The estimates raise questions about the protective measures as policy tools. The benefits accruing to domestic producers, which protection is intended to provide, may be represented by net implicit income transfers. It was found that the net transfer of about 10.7 trillion won was effected through levying an implicit protection tax of nearly twice its size, 21.6 trillion won. The effective rates of protection were found to differ widely across the industries, and for some they were negative. The question is if the large protection tax is worth the resulting incentive structure, which may be far from what is intended. Another question is if the structure of ERPs can at all be manipulated to policy makers' liking by selecting tariffs and non-tariff measures.

The findings also raise a serious question about the impact of the protective measures on the export incentives. It is well known that import duties have the same effects as export duties. In the context of this empirical study, it may be said that, the greater the ERPs, the greater is the bias against exports. A producer would be indifferent between domestic sales and export sales, if the ERP for export production can be raised to the same level as that for domestic production. The required amount of subsidies for

this purpose can be estimated by multiplying an industry's exports by the ERP estimate for the industry. The amount for all manufacturing industries excluding food industry, not to speak of agricultural sector, would be 2.9 trillion won. Even if the outstanding loans at the end of the same year made by deposit money banks to exporters were all forgiven, it would not have been sufficient to make domestic producers indifferent between domestic sales and export sales, for the total loans were less than 2 trillion won.

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Table 1: ERP Estimates by KSIC 3-digit Industries – Corden Method

(unit: %)

KSIC 3-digit Industries	ERP	NRP	NRP, Average for Inputs	Inputs/ Output
All industries	34.5	28.3	24.3	60.3
Agriculture	159.7	101.9	24.1	42.6
Forestry	6.4	7.5	19.4	8.3
Fishing	15	13.9	10.5	24.2
Mining	-2.1	0.4	11.8	17.9
Manufacturing	15.9	21.4	24.5	64.2
Food	27.5	81.4	99.0	75.3
Beverage	10.6	24.2	38.1	49.3
Tobacco	99.9	40.0	11.1	67.4
Textiles	-12.3	3.8	12.9	64.0
Clothing	22.3	13.0	8.1	65.6
Leather	-11.8	4.6	10.0	75.1
Footwear	23.3	12.5	8.3	71.8
Wood	-1.1	3.5	5.8	66.9
Furniture	-2.3	4.2	8.6	59.3
Pulp, paper	7.7	7.8	7.9	64.4
Printing	-7.0	1.8	12.2	45.9
Industrial chemicals	13.7	11.3	9.9	62.9
Other chemicals	42.6	26.1	14.6	58.7
Oil refining	14.5	9.0	6.1	65.5
Petrol., coal products	4.0	2.2	1.7	76.7
Rubber products	6.0	8.6	10.7	56.0
Plastic products	1.3	12.4	18.6	64.0
Pottery, china	6.2	7.7	9.8	41.7
Glass	11.1	10.7	10.2	42.7
Other nonmetal min. prods.	3.4	4.9	6.4	50.8
Iron & steel	0.6	2.8	3.6	73.8
Nonferrous metal	6.3	5.0	4.4	68.4
Fabricated metal	6.7	6.9	7.1	57.8
Nonelectrical mach	24.9	17.9	12.3	55.9
Electrical mach.	47.3	25.3	14.2	66.4
Transport equip.	11.5	13.0	13.9	63.8
Prof., scien. Equip.	26.0	20.9	17.0	57.1
Miscellaneous mfg.	10.8	11.3	11.6	56.6
All Industries ex. Ag.	14.9	20.7	24.3	62.1
Mfg. ex. Foods	14.7	11.9	10.2	62.4

Table 2: ERP Estimates by KSIC 3-digit Industries – Balassa Method

(unit: %)

KSIC 3-digit Industries	ERP	NRP	NRP, Average for Inputs	Inputs/ Output
All industries	47.0	28.3	20.7	71.0
Agriculture	183.2	101.9	20.5	49.9
Forestry	6.5	7.5	16.4	9.8
Fishing	17.1	13.9	7.5	33.6
Mining	-2.5	0.4	7.1	30.0
Manufacturing	22.7	21.4	21.0	75.4
Food	52.5	81.4	85.6	87.1
Beverage	15.1	24.2	29.3	64.2
Tobacco	123.9	40.0	10.1	73.7
Textiles	-15.9	3.8	11.5	72.2
Clothing	30.6	13.0	7.1	74.9
Leather	-67.7	4.6	63.7	55.0
Footwear	31.8	12.5	7.5	79.3
Wood	-1.7	3.5	5.0	77.9
Furniture	-3.5	4.2	6.9	73.9
Pulp, paper	11.4	7.8	6.7	76.0
Printing	-9.3	1.8	9.5	59.2
Industrial chemicals	21.1	11.3	8.2	75.9
Other chemicals	73.5	26.1	11.2	76.1
Oil refining	16.4	9.0	5.7	69.6
Petrol., coal products	7.1	2.2	1.5	86.8
Rubber products	7.6	8.6	9.2	65.3
Plastic products	1.8	12.4	16.1	74.1
Pottery, china	8.3	7.7	7.2	56.5
Glass	14.5	10.7	7.8	56.3
Other nonmetal min. prods.	4.8	4.9	5.0	65.0
Iron & steel	0.8	2.8	3.2	81.0
Nonferrous metal	9.3	5.0	3.8	78.7
Fabricated metal	9.5	6.9	5.9	70.0
Nonelectrical mach	35.7	17.9	9.9	69.3
Electrical mach.	73.0	25.3	12.0	78.2
Transport equip.	17.6	13.0	11.6	76.3
Prof., scien. Equip.	37.7	20.9	13.8	70.4
Miscellaneous mfg.	14.4	11.3	9.7	67.6
All Industries ex. Ag.	20.7	20.7	20.8	73.2
Mfg. ex. Foods	20.3	11.9	8.8	73.5

Table 3: Income Transfer Estimates

	Gross Income Transfer (bil. won)	Proportion in Output Value (%)	Distribution (%)	Net Income Transfer (bil. won)	Distribution (%)
All industries	18,053.0	10.2	100.0	10,755.8	100.0
Agriculture	7,720.5	49.2	42.8	6,944.7	64.6
Forestry	41.6	5.6	0.2	32.6	0.3
Fishing	181.3	7.8	1.0	148.3	1.4
Mining	5.5	0.3	0.0	-25.8	-0.2
Manufacturing	10,104.2	6.8	56.0	3,656.0	34.0
Food	2,929.2	22.8	16.2	316.7	2.9
Beverage	368.2	11.6	2.0	82.1	0.8
Tobacco	169.7	8.4	0.9	138.1	1.3
Textiles	87.8	0.8	0.5	-101.1	-0.9
Clothing	215.7	2.6	1.2	127.4	1.2
Leather	13.9	1.1	0.1	-8.9	-0.1
Footwear	19.1	2.4	0.1	10.0	0.1
Wood	35.9	2.6	0.2	-3.8	0.0
Furniture	31.4	3.3	0.2	-6.9	-0.1
Pulp, paper	211.7	5.4	1.2	74.0	0.7
Printing	31.7	1.6	0.2	-65.2	-0.6
Industial chemicals	343.2	5.7	1.9	154.3	1.4
Other chemicals	1,084.7	14.0	6.0	730.1	6.8
Oil refining	364.2	6.0	2.0	202.6	1.9
Petrol.,coal products	34.9	2.1	0.2	14.5	0.1
Rubber products	80.2	1.9	0.4	24.4	0.2
Plastic products	200.7	5.2	1.1	7.6	0.1
Pottery, china	7.4	3.0	0.0	3.5	0.0
Glass	51.3	6.0	0.3	30.4	0.3
Other nonmetal Mineral prods.	166.3	4.1	0.9	56.8	0.5
Iron & steel	192.2	1.5	1.1	10.3	0.1
Nonferrous metal	62.2	2.5	0.3	24.6	0.2
Fabricated metal	209.8	3.6	1.2	85.8	0.8
Nonelectric mach.	982.4	11.0	5.4	603.8	5.6
Electrical mach.	1,287.9	6.3	7.1	808.6	7.5
Transport equip.	673.2	6.2	3.7	215.6	2.0
Prof., scien. Equip.	144.5	9.7	0.8	77.4	0.7
Miscellaneous mfg.	104.8	3.0	0.6	43.5	0.4
All Industries ex. Ag.	15,210.8	6.4	57.2	3,811.1	35.4
Mfg. ex. Foods	7,175.0	5.2	39.8	3,339.4	31.1

Appendix Table 1: Estimation Results – Corden Method

I-O Industries	ERP	NRP, Output	NRP, Average for Inputs	Inputs/ Output
1. Unmilled rice	499.6	311.0	26.2	39.8
2. Barley, wheat and other cereals	916.2	275.3	15.6	71.2
3. Vegetables	13.4	15.4	25.2	16.7
4. Fruits	140.1	98.8	11.5	32.1
5. Other edible crops	867.8	390.0	48.1	58.3
6. Non-food crops	8.4	12.0	25.0	21.7
7. Livestock breeding	144.6	43.5	22.9	83.1
8. Sericulture	76.9	64.0	23.6	24.2
9. Agricultural services	-7.0	0.0	20.5	25.4
10. Forest planting and conservation	10.0	11.1	13.6	30.2
11. Forestry products	6.2	7.3	20.7	7.1
12. Fishing	13.0	12.4	10.6	25.8
13. Aquaculture	21.9	19.8	9.8	17.7
14. Coal mining	-1.0	1.0	10.5	17.2
15. Iron ore	-1.6	1.0	13.9	16.8
16. Nonferrous metal ores mining	-2.5	1.0	13.7	22.1
17. Crude oil and natural gas				
18. Stone, sand and gravel	-4.7	-2.3	12.7	13.9
19. Limestone, ceramic and refractory minerals	-3.0	1.7	13.9	27.6
20. Other nonmetallic minerals	0.2	3.4	13.9	23.4
21. Meat and meat products	-346.6	121.6	45.4	119.4
22. Dairy products	-214.7	333.5	48.5	208.3
23. Conned or preserved fruits and vegetables	-29.0	4.7	31.0	56.2
24. Processed seafood products	-3.8	7.8	13.7	66.6
25. Polished rice		311.0	296.1	99.2
26. Polished barley		292.3	108.4	172.9

27. Flour and cereal preparations	-17.5	54.3	95.1	63.8
28. Sugar	58.2	27.4	16.6	74.2
29. Bread, confectionery product and noodles	-26.7	2.2	30.2	50.8
30. Seasonings	-19.3	6.7	22.5	62.2
31. Animal and vegetable oils and fats, and allied products	-73.3	15.0	164.0	37.2
32. Other food preparations	-73.6	5.7	69.5	55.4
33. Prepared livestock feeds	-43.5	10.5	51.1	57.1
34. Alcoholic beverages	4.8	23.0	43.3	47.2
35. Soft drinks	19.0	25.8	32.1	52.1
36. Tobacco products	99.9	40.0	11.1	67.4
37. Cotton yarn	-12.0	2.9	13.8	57.7
38. Silk yarn	-66.3	8.0	59.4	59.1
39. Woolen yarn	-33.3	3.3	26.9	60.8
40. Hempen Yarn	-5.9	11.0	20.2	64.7
41. Chemical fiber yarn	-23.0	10.6	22.9	73.2
42. Other fiber yarn and thread	-0.5	5.7	9.5	61.9
43. Cotton fabrics	-15.5	-1.7	5.1	66.9
44. Silk fabrics	-19.4	-0.3	7.9	69.8
45. Woolen fabrics	37.3	22.6	12.3	58.9
46. Hempen fabrics	-1.3	7.3	9.9	76.5
47. Chemical fiber fabrics	-15.9	1.1	10.5	64.4
48. Other fiber fabrics	-20.2	-1.3	9.7	63.1
49. Knitted fabrics	16.4	12.0	9.7	64.9
50. Fiber bleaching and dyeing	-9.2	0.0	12.5	42.4
51. Knitted products	20.1	12.7	8.3	63.2
52. Cordage, rope and fishing nets	-21.1	0.5	13.1	63.3
53. Miscellaneous fabricated textile products	8.2	7.0	6.4	66.3
54. Wearing apparels and dress accessories	26.6	13.5	7.8	69.4
55. Leather and fur products	-11.8	4.6	10.0	75.1

56. Leather products	23.3	12.5	8.3	71.8
57. Lumber	-6.1	1.6	4.8	70.6
58. Plywood	5.3	6.4	6.9	69.1
59. Wooden furniture	-2.3	4.2	8.6	59.3
60. Other wood products	-3.0	1.4	5.7	51.4
61. Pulp	-2.2	2.0	6.0	51.2
62. Paper	21.1	10.5	5.6	68.5
63. Paper products	-2.0	5.8	10.7	61.8
64. Printing and publishing	-7.0	1.8	12.2	45.9
65. Basic chemicals	3.0	7.6	10.4	62.4
66. Other basic organic chemicals	15.2	11.2	9.4	69.5
67. Synthetic resins	48.7	22.8	10.9	68.5
68. Synthetic rubber	15.4	13.0	11.9	69.2
69. Basic inorganic chemicals	12.2	10.0	8.1	53.0
70. Chemical fibers	10.1	10.7	11.0	67.5
71. Chemical fertilizers	6.2	8.8	10.0	68.2
72. Agricultural chemicals	-12.0	0.7	7.9	63.8
73. Pharmaceuticals	27.6	23.2	17.9	45.3
74. Cosmetics and toothpaste	372.1	94.6	19.1	78.6
75. Dyestuffs, pigments and paints	8.7	10.7	12.0	61.0
76. Soap and synthetic detergents	162.6	45.0	13.8	79.0
77. Other chemical products	27.3	16.8	11.0	64.9
78. Synthetic resins products	1.3	12.4	18.6	64.0
79. Naphtha	22.7	11.1	5.3	66.7
80 .Fuel oils	14.3	8.5	5.3	64.2
81. Other petroleum products	11.2	11.2	11.2	74.2
82. Coal products	4.0	2.2	1.7	76.7
83. Rubber products	6.0	8.6	10.7	56.0
84. Pottery china and earthenware	6.2	7.7	9.8	41.7
85. Glass and glass products	11.1	10.7	10.2	42.7

86. Clay products for construction	16.5	13.0	8.8	45.7
87. Cement	10.2	8.0	5.6	47.7
88. Cement products	-7.5	0.0	6.4	54.0
89. Other ceramic and nonmetallic mineral products	11.3	8.4	5.6	51.2
90. Iron manufacturing	-3.8	1.5	3.9	69.2
91. Steel ingots and semi-finished products	0.0	2.3	2.9	78.7
92. Hot rolled steel products	0.9	2.5	3.1	74.2
93. Cold rolled steel products	1.0	3.9	4.8	75.5
94. Steel tubes and pipes	20.2	8.4	4.5	75.1
95. Iron and steel foundry products and forgings	-4.2	1.1	5.9	52.6
96. Nonferrous metal ingots	3.9	3.6	3.5	65.3
97. Primary nonferrous metal products	8.0	5.9	5.0	70.4
98. Metal furniture and household metal articles	18.7	12.9	8.9	59.4
99. Metal products for construction	-5.1	1.3	6.3	55.7
100. Other metal products	23.5	13.8	7.5	60.7
101. Power generating machinery and boilers	36.8	25.1	15.0	53.5
102. Metal working and processing machinery	29.6	19.9	11.7	54.5
103. Industrial machinery	11.6	11.9	12.1	57.9
104. Office and service industry machinery	92.0	39.5	15.4	68.5
105. Other general industrial machinery and equipment	15.0	12.4	10.5	57.5
106. General machinery parts	12.2	10.8	8.9	42.5
107. Household electrical appliances	181.6	61.5	19.4	74.0
108. Electrical industrial apparatus	9.2	10.9	11.9	62.6
109. Other electrical equipment, and supplies	26.7	15.7	10.2	66.6
110. Household electrical appliances	93.7	35.6	14.5	73.4
111. Electronic appliances	-6.7	10.3	18.3	68.2
112. Electronic components	3.6	9.2	12.8	61.4
113. Communication equipment	67.0	35.3	15.3	61.3

114. Shipbuilding and repairing	-20.7	1.5	14.1	63.8
115. Railroad vehicles	-19.4	0.1	17.1	53.4
116. Motor vehicles	16.7	14.8	13.8	64.1
117. Aircraft	-0.3	3.3	5.4	63.4
118. Other transportation equipment	7.2	12.5	15.4	64.6
119. Measuring and medical instruments	15.6	14.3	13.1	54.1
120. Photographic and optical instruments	43.4	30.4	19.3	53.9
121. Watches and clocks	25.4	21.7	19.6	63.8
122. Miscellaneous manufactured products	10.8	11.3	11.6	56.6

Appendix Table 2: Estimation Results - Balassa's ERP

I-O Industries	ERP	NRP, Output	NRP, Average for Input	Inputs/ Output
1. Unmilled rice	564.2	311.0	22.4	46.7
2. Barley, wheat and other cereals	1193.4	275.3	14.2	77.9
3. Vegetables	13.9	15.4	21.8	19.3
4. Fruits	161.7	98.8	9.0	41.2
5. Other edible crops	1097.3	390.0	41.8	67.0
6. Non-food crops	8.9	12.0	21.3	25.4
7. Livestock breeding	671.3	43.5	19.8	96.4
8. Sericulture	79.7	64.0	21.3	26.9
9. Agricultural services	-8.0	0.0	15.1	34.5
10. Forest planting and conservation	11.3	11.1	10.8	38.1
11. Forestry products	6.3	7.3	17.8	8.3
12. Fishing	15.1	12.4	1.6	36.2
13. Aquaculture	23.6	19.8	7.4	23.6
14. Coal mining	-1.1	1.0	6.3	28.6
15. Iron ore	-2.1	1.0	6.9	34.7
16. Nonferrous metal ores mining	-3.4	1.0	7.3	41.3
17. Crude oil and natural gas				
18. Stone, sand and gravel	-5.2	-2.3	7.6	23.0
19. Limestone, ceramic and refractory minerals	-4.1	1.7	8.1	47.4
20. Other nonmetallic minerals	0.3	3.4	8.5	38.1
21. Meat and meat products	-172.5	121.6	39.0	139.0
22. Dairy products	-147.6	333.5	39.2	257.5
23. Conned or preserved fruits and vegetables	-40.5	4.7	25.4	68.6
24. Processed seafood products	-5.5	7.8	11.8	77.0
25. Polished rice		311.0	278.3	105.5
26. Polished barley		292.3	103.7	180.8

27. Flour and cereal preparations	-23.4	54.3	83.3	72.8
28. Sugar	82.6	27.4	15.1	81.8
29. Bread, confectionery product and noodles	-34.9	2.2	24.6	62.3
30. Seasonings	-29.7	6.7	18.5	75.4
31. Animal and vegetable oils and fats, and allied products	-86.2	15.0	130.9	46.6
32. Other food preparations	-94.2	5.7	59.1	65.1
33. Prepared livestock feeds	-54.0	10.5	44.5	65.5
34. Alcoholic beverages	6.8	23.0	32.6	62.6
35. Soft drinks	27.0	25.8	25.2	66.3
36. Tobacco products	123.9	40.0	10.1	73.7
37. Cotton yarn	-14.8	2.9	12.1	65.8
38. Silk yarn	-84.6	8.0	51.7	67.9
39. Woolen yarn	-40.7	3.3	24.1	67.9
40. Hempen Yarn	-7.3	11.0	18.2	71.9
41. Chemical fiber yarn	-33.8	10.6	20.5	81.8
42. Other fiber yarn and thread	-0.7	5.7	8.4	70.6
43. Cotton fabrics	-20.1	-1.7	4.6	74.4
44. Silk fabrics	-24.6	-0.3	7.3	76.2
45. Woolen fabrics	43.9	22.6	11.2	65.1
46. Hempen fabrics	-1.6	7.3	9.3	81.8
47. Chemical fiber fabrics	-20.7	1.1	9.3	72.6
48. Other fiber fabrics	-24.9	-1.3	8.8	70.1
49. Knitted fabrics	20.3	12.0	8.8	71.7
50. Fiber bleaching and dyeing	-12.0	0.0	9.5	55.9
51. Knitted products	26.7	12.7	7.3	72.3
52. Cordage, rope and fishing nets	-27.1	0.5	11.6	71.5
53. Miscellaneous fabricated textile products	10.4	7.0	5.7	73.6
54. Wearing apparels and dress accessories	38.5	13.5	6.9	78.9
55. Leather and fur products	-67.7	4.6	63.7	55.0

56. Leather products	31.8	12.5	7.5	79.3
57. Lumber	-8.9	1.6	4.3	79.6
58. Plywood	8.1	6.4	6.0	80.0
59. Wooden furniture	-3.5	4.2	6.9	73.9
60. Other wood products	-4.6	1.4	4.3	68.4
61. Pulp	-3.1	2.0	4.8	64.5
62. Paper	36.0	10.5	4.7	81.5
63. Paper products	-2.7	5.8	9.2	71.8
64. Printing and publishing	-9.3	1.8	9.5	59.2
65. Basic chemicals	4.6	7.6	8.6	75.2
66. Other basic organic chemicals	22.0	11.2	8.3	78.8
67. Synthetic resins	83.0	22.8	9.2	81.5
68. Synthetic rubber	26.4	13.0	10.1	82.0
69. Basic inorganic chemicals	17.9	10.0	6.3	67.9
70. Chemical fibers	17.4	10.7	9.2	81.1
71. Chemical fertilizers	9.4	8.8	8.6	78.9
72. Agricultural chemicals	-19.1	0.7	6.5	77.3
73. Pharmaceuticals	43.4	23.2	12.4	65.3
74. Cosmetics and toothpaste	-642.0	94.6	13.3	112.4
75. Dyestuffs, pigments and paints	11.8	10.7	10.3	71.2
76. Soap and synthetic detergents	956.6	45.0	11.3	96.4
77. Other chemical products	38.2	16.8	9.6	74.9
78. Synthetic resins products	1.8	12.4	16.1	74.1
79. Naphtha	25.0	11.1	5.1	69.8
80. Fuel oils	15.9	8.5	5.0	67.8
81. Other petroleum products	15.6	11.2	10.2	81.5
82. Coal products	7.1	2.2	1.5	86.8
83. Rubber products	7.6	8.6	9.2	65.3
84. Pottery china and earthenware	8.3	7.7	7.2	56.5
85. Glass and glass products	14.5	10.7	7.8	56.3

86. Clay products for construction	22.0	13.0	6.8	59.3
87. Cement	15.7	8.0	4.0	66.1
88. Cement products	-10.0	0.0	5.3	65.5
89. Other ceramic and nonmetallic mineral products	17.0	8.4	4.2	67.4
90. Iron manufacturing	-5.6	1.5	3.4	79.4
91. Steel ingots and semi-finished products	0.0	2.3	2.7	85.4
92. Hot rolled steel products	1.1	2.5	2.8	80.3
93. Cold rolled steel products	1.3	3.9	4.4	82.3
94. Steel tubes and pipes	29.1	8.4	4.1	82.8
95. Iron and steel foundry products and forgings	-5.3	1.1	4.9	63.2
96. Nonferrous metal ingots	5.9	3.6	2.9	77.3
97. Primary nonferrous metal products	11.7	5.9	4.4	79.6
98. Metal furniture and household metal articles	26.9	12.9	7.4	71.7
99. Metal products for construction	-7.0	1.3	5.2	67.8
1001. Other metal products	34.0	13.8	6.3	72.9
101. Power generating machinery and boilers	54.5	25.1	11.7	68.5
102. Metal working and processing machinery	45.5	19.9	9.1	70.4
103. Industrial machinery	17.0	11.9	9.8	71.1
104. Office and service industry machinery	154.3	39.5	13.0	81.2
105. Other general industrial machinery and equipment	19.9	12.4	8.9	67.9
106. General machinery parts	16.8	10.8	6.5	58.2
107. Household electrical appliances	450.7	61.5	16.0	89.5
108. Electrical industrial apparatus	13.2	10.9	10.1	73.9
109. Other electrical equipment, and supplies	38.7	15.7	8.8	76.9
110. Household electrical appliances	163.8	35.6	12.6	84.8
111. Electronic appliances	-9.0	10.3	16.3	76.3
112. Electronic components	5.1	9.2	10.8	72.9
113. Communication equipment	100.6	35.3	12.6	74.2
114. Shipbuilding and repairing	-45.8	1.5	10.7	83.7

115. Railroad vehicles	-26.8	0.1	13.8	66.2
116. Motor vehicles	24.9	14.8	11.6	75.9
117. Aircraft	-0.3	3.3	5.1	67.1
118. Other transportation equipment	11.7	12.5	12.7	78.2
119. Measuring and medical instruments	22.3	14.3	10.5	67.9
120. Photographic and optical instruments	64.4	30.4	15.1	68.9
121. Watches and clocks	36.6	21.7	16.7	74.8
122. Miscellaneous manufactured products	14.4	11.3	9.7	67.6